Lab Exercise 4: Working with Files and ADTs

SE2205: Data Structures and Algorithms using Java – Fall 2022

Open Day: October 25, 2022; **Cut off time**: Sunday October 30, 2022 @11 pm

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A. Rationale and Background

In this lab exercise we will work on Files and Map/Set ADTs.

B. Evaluation and Submission Instructions

You will get credit for this lab exercise when you submit the working code. No part-mark will be awarded if the code does not run. No mark will be awarded if you submit your code with a bunch of print statements. Submit your lab work online by carrying out the following instructions:

1. Create a Project with the following name: *username_LabExcercise4*
2. Download the text file (*SE2205Students.txt*) inside this project folder to not to worry about the path. But if you are comfortable, you can download the text file anywhere, and use the path in the code; we talked about it in Unit 6, ES1036.
3. For this question create a package (LE4Q1)
4. Use meaningful names for each class and the associated variables by following the general naming conventions.
5. Use the static header and footer methods your created before.
6. Comments: Writing comment for Lab Exercises is not mandatory but it is recommended.
7. Once the assignment is completed, go to your 'Assignments' folder. Select the project folder (e.g. *username_LabExcercise4*). Right-click to select 'Send to' 'Compressed zipped folder'. Make sure it has the same naming convention (e.g. *username_LabExcercise4.zip*). Upload this file on OWL as your submission.

C. Lab Question

1. [15 Marks]

In this exercise, your code will read the names of the SE2205 students from a given file SE2205Students.txt and find out how many students are there with the same last name or same first name. The data item on each line in the file has been provided as "last name followed by the other names", where the last part of the other name is the first name of the student. Please check the content of the file before you write your code. Also, write the code for the common last names first and then update it by adding similar parts for the common first names.

Inside the package you just created, create a class called *YourFirstName ExerciseOnFileMapSet* and define the driver method, in which you need to address the following specifications:

(a) Create a TreeMap<>. The TreeMap<> will have a String and an Integer tag that will correspond to the last name (key) and an integer number (value), where the integer number will keep track of the number of students that have the same last name.

(b) Create a File object-reference and check whether the file called *SE2205Students.txt* exists or not (see unit 2-Part 2 where the example codes have been provided with files).

(c) Now from the file, read every line and then extract the last name and from there put it in the tree map. Tree map ensures that the whole map is sorted. [Hint: you can use String's split method to extract the last name. See Unit 2 - Part 3 for all the relevant codes, which have already been provided directly or indirectly]. Once done, close the file.

(d) Create a Set with all the key-entries with the use of Map’s entrySet() method [see UML diagrams in Unit 2 - Part 3; the code is already available in the handout] which will have all the key entries in the Set.

(e) Print the list of the Number of students with the same Last Names using a public static void method. [See the sample output; you are required to use formatted output (Hint: check the printf() format specifiers for this. In the same output, names are right justified, there is tab space, all the names are given same number of spaces in the display etc.) to make it look like the sample output.]

(f) Repeat steps (a) to (f) for the first name by incorporating the required parts as you have written for Last Name. **You are strongly recommended to create as many public static methods (e.g., printList(), populateTreeMap() etc.) as you see fit to avoid code-repetition.**

(g) Note: After looking at the output of your code, you can double check your result by browsing the text file.

Sample output:

```
=========================================================
Lab Exercise 4
Prepared By: Quazi Rahman
Student Number: 999999999
Goal of this Exercise: ........!
=========================================================
List of the Number of students with the same Last Names:
 Last-name          numbers
----------------------------------------
        Al           2
        El           2
     Gupta           2
        Li           2
       Lim           2
     Patel           7
    Sharma           2
     Singh           2
      Wang           2
```

```
   List of the Number of students with the same First Names:
    First-name           numbers
   ---------------------------------------
      Aaron              2
        Ali              4
Christopher              2
       Cole              2
     Daniel              2
      David              2
      Ethan              2
      Hasan              2
      James              4
     Joshua              2
      Kevin              2
      Lucas              2
       Luke              2
    Madison              2
       Mark              2
    Matthew              3
    Michael              3
   Muhammad              2
     Nathan              3
    Nicolas              2
       Omar              3
    William              2
   =========================================================
   Completion of Lab Exercise 4 is successful!
   Signing off - Quazi
   =========================================================
```